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Sequence Listing
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<110> ITO, Yoshitaka

TAKAMIZAWA, Kazuhiro

IWAHASHI, Hitoshi

5

<120> METHOD OF JUDGING BIOLOGICAL ACTIVITY IN BIOREMEDIATION SITE AND POLYNUCLEOTIDE FOR DETECTING MICROORGANISM TO BE USED THEREIN

<130> 10873.1940USWO

10 <140> New Application

<141> 2006-08-23

<150> PCT/JP2005/003175

<151> 2005-02-25

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<150> JP application No.2004-50082

<151> 2004-02-25

<150> JP application No.2004-50083

20 <151> 2004-02-25

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<170> PatentIn version 3.3

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<211> 742

<212> DNA

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| 5  | gagagattga | atgaaaaagg | ggcttatagc | tcaggtggtt | agagcgtacc | cctgataagg | 180 |
| 0  | gtaaggtcag | aggttcgagt | cctcttaagc | ccaccatggg | gaattagctc | agctgggaga | 240 |
|    | gcgcctgctt | tgcacgcagg | aggtcagcgg | ttcgatcccg | ctattctcca | ccatttttta | 300 |
| 10 | gagaaatggt | gaaagattgc | caagagacat | tgttagtgag | aatgaagaca | caatgtctaa | 360 |
|    | tataagaaca | atttaggttg | tttttatatt | agactttta  | gtctaagttt | atgttctaca | 420 |
| 15 | atttagaata | cgacgctttg | tgttgtgctg | taggtttggt | tctttaagat | agctttgcta | 480 |
| 10 | tctggtgaaa | gaacataaag | atgttattta | atttattatt | gtcaaagtca | acaaaacgca | 540 |
|    | aaaaaaacaa | tttacaactt | gttagatgtt | ttacatttaa | taagggagtg | aaatgtgcat | 600 |
| 20 | tagaatacaa | ataggtaagc | tattaagagc | gaatggtgga | tgcctaggct | gtaagaggcg | 660 |
|    | atgaaggacg | tactagactg | cgataagtta | cggggagctg | tcaagaagct | ttgatccgta | 720 |
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30 <213> Desulfitobacterium frappieri

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|    | agatga | agtg | aaacggttca      | aagctggaga | agtctgaaga | gacttcgaaa  | tgccgaagag | 180 |
| 10 | gcaaag | cagg | ggaaatctgc      | ataagatgac | cctgaaatcg | agtcaaacct  | gttcaagcgc | 240 |
| -0 | aagctt | actt | gttgtttagt      | tttgagggac | cagcaatgga | aactcattat  | ttttttgacc | 300 |
|    | aaaagt | caag | aaaaactgtt      | ctttgaaaac | tgcacagaga | agaaaaaaact | gtaatttagg | 360 |
| 15 | ataaca | tctg | aaaaacctga      | atgtggcgga | gacgtttggt | caagctacta  | agggcgtacg | 420 |
|    | gtggat | gcct | aggcgctaag      | agtcgaagaa | ggacgcggcg | agcggcgaaa  | cgccacgggg | 480 |
| 20 | agcagt | aagc | atgctttgat      | ccgtggatat | ccgaatgggg | саассса     |            | 527 |
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| 30 | aactcc | cgtc | ggtgggtcac      | acaggtgact | ccgccacggg | cagagccatt  | tcggattcac | 120 |

|    | acgtaatc | cg gtggtgctca  | tgggtggaac | gctgacagct | acttctcgtc | cgggtcccgt | 180 |
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| 5  | ttctgtgc | gg gatccgagga  | gttatatcgg | tgcactgttg | ggtcctgaga | gaacacgcga | 240 |
| อ  | gtgttttg | tc agcgacgatg  | atccgcgaaa | caagaggaca | tggttttctt | gcggtagggg | 300 |
|    | ttgttgtg | tg ttgtttgaga  | actgcacagt | ggacgcgagc | atctttgttg | taagtgttta | 360 |
| 10 | tgagcgta | cg gtggatgcct  | tggcaccagg | agccgatgaa | ggacgtggga | ggctgcgata | 420 |
|    | tgcctcgg | gg agctgtcaac  | cgagctgtga | tccgaggatt | tccgaatggg | gcaaccca   | 478 |
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|    | aactcctt | gc tcggaccagc  | acacaggtgc | cgggggagcg | aggcagagcc | atttcggatt | 120 |
| 25 | cacacgta | at ccggtggtgc  | tcatgggtgg | aacgctgaca | gtcatcaccg | cgcgggaagg | 180 |

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gagtgttttg tcagcgacga tgatcgggaa cgaaggggtt gtttcttctt ccggtaccgg

|     | ttgttgt   | tgtg  | ttgtttgaga   | actgcacagt | ggacgcgagc | atctttgttg | taagtgttta | 360  |
|-----|-----------|-------|--------------|------------|------------|------------|------------|------|
|     | tgagcgt   | tacg  | gtggatgcct   | tggcaccagg | agccgatgaa | ggacgtggga | ggctgcgata | 420  |
| 5   | tgcctcg   | gggg  | agctgtcaac   | cgagctgtga | tccgaggatt | tccgaatggg | gaaaccca   | 478  |
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| 15  |           |       |              |            |            |            |            |      |
|     | atccct    | cagt  | attgagactt   | cggtctcgat | ctatcggatc | tcttcagaaa | catcagccgg | 120  |
|     |           |       |              |            |            |            |            |      |
|     | acatag    | gtgg  | aaacatcatg   | atctggcatt | ggcgggacac | cgccgtcttc | gtttctcttt | 180  |
| 0.0 |           |       |              |            |            |            |            | 0.46 |
| 20  | cttcgc    | ggac  | aagcttgacg   | cccaggttgc | ggtcctttgg | actgcgttcc | ggtttcgggc | 240  |
|     | _ 1 _ 1   | . 4   |              |            |            |            |            | 200  |
|     | ctgtage   | стса  | ggtggttaga   | gcgcacccct | gataagggtg | aggtcggacg | ttcgagtcgt | 300  |
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| 25  | cccagge   | Jula  | CCaccaccag   | acagitoitg | CCLECECCC  | atgtocgaag | Cttogogaac | 300  |
| 20  | tetege    | -+ o+ | ggcatectgt   | gatggggcca | tageteagtt | gggagagcgc | gtgctttgca | 420  |
|     | COLOGO    | Jugu  | 8800100181   | 54.5555CCa | tagotoagtt | 9999999080 | 5-50504    | 120  |
|     | agcates   | aggt  | cetceettce   | atoccetote | getecaceat | tcttctttc  | ttgaggaaga | 480  |
|     | ~0~~ . 86 | -00   |              |            | 911300000  |            | 0-000      |      |
|     |           |       |              |            |            |            |            |      |

tgatggcagg gtggtttgcg ctcggctcct ttgagtgaag gctcttgggg tcttgagcgt 540

|    | cttgtccgcg | aatatctgtt  | tcgcatgttc | catcatgccg | gtctccggcg | gaacatgcac | 600 |
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| 5  | ggctgtatga | catcgtgaat  | agggcattga | togactgtac | cgtggcaaca | cggtcgggtc | 660 |
| 3  | gtggggaagg | tggcgacacc  | tttcgatgcg | atcattgggt | gctgaccgca | ccattgtcga | 720 |
|    | caatgcgaag | ctggtctttt  | caaagaagac | gtcgaagccg | tccggccggg | agcaatcctg | 780 |
| 10 | gtgcgggcct | ctgccgaggg  | gtgggcatcg | acgatgagaa | cgatcaagtg | tcttaagggc | 840 |
|    | attcggtgga | tgccttggcg  | ctaagaggcg | aagaaggacg | tgatacgctg | cgataagctt | 900 |
| 15 | cggggagccg | cgaatgggct  | ttgatccgga | gatttccgaa | tggggcaacc | ca         | 952 |
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| 25 | ccacgagacc | tggccggccc  | gtaaatcgcg | ggatcagccg | attgtcaggc | gattcgttgg | 120 |
|    | atggcccttt | cacctgtagt  | gggtgggggt | ctggtgcacg | acaagcaaac | gaccaggatg | 180 |
|    | gggaccttcc | ttgtgggggt  | tgtctggtgc | tgccaaacac | actgttgggc | tttgagacaa | 240 |

|    | caggcco      | cgtg | cccgggtttc   | cgggtggctc   | cgcggtggtg | gggtcggcgt | gttgttgcct | 300 |
|----|--------------|------|--------------|--------------|------------|------------|------------|-----|
|    | cacttt       | ggtg | gtggggtgtg   | gtgtttgatt   | tgtggatagt | ggttgcgagc | atctagcacg | 360 |
| 5  | caaatg       | tggc | tctcgaggct   | ttcgggtctg   | gggggtgtgt | ttgtgtgctt | ttgatgtgca | 420 |
|    | gtttct       | tttt | tcgaattggt   | tttttgtgtt   | gtaagtgttt | aagggcgcat | ggtggatgcc | 480 |
| 10 | ttggca       | ctgg | gagccgatga   | aggacgtggg   | aggctgcgtt | atgcctcggg | gagctgtcaa | 540 |
| 10 | ccgagc       | gtgg | atccgaggat   | gtccgaatgg   | ggcaaccca  |            |            | 579 |
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|    | <213>        | Desi | ulfomicrobiu | ım norvegici | um         |            |            |     |
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|    | ctccaa       | ctcg | ctatttactt   | gcaaggtttc   | ttaccttgtc | ggtttagaaa | tgggcttgta | 120 |
|    | gctcag       | gtgg | ttagagcgca   | cgcctgataa   | gcgtgaggtc | ggaagttcaa | gtcttcccag | 180 |
| 25 | gcccac       | catt | tcttagtggg   | ggtgtagctc   | agctgggaga | gcgcctgcct | tgcacgcagg | 240 |
|    | aggtca       | tcag | ttcgatcctg   | ttcacctcca   | ccattttcca | actcgacaag | aatttatgtt | 300 |
| 30 | gctagt       | cttt | atcgtcagag   | tgtcttttga   | cactatggcg | cccaagcata | gcagcttgtg | 360 |

|    | atcattgaca             | a gacgaatagg | tgaagagaag   | agagttaaga | tgttaagggc | atacggtgga | 420 |
|----|------------------------|--------------|--------------|------------|------------|------------|-----|
| 5  | tgccttggc              | g tcaggaggcg | atgaaggacg   | tggaaggctg | cgataagcct | cggggagccg | 480 |
| U  | tcaagcaggo             | c tttgatccgg | ggatttccga   | atggggcaac | сса        |            | 523 |
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| 10 | <211> 662              | 2            |              |            |            |            |     |
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|    | <400> 8                |              |              |            |            |            |     |
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|    | catggtttc <sup>.</sup> | t cgctagagaa | atcatatcct   | aaggtcgatg | ctttgaagaa | cgtcacggaa | 120 |
| 20 | gcaatgaag              | t gaaacgattc | aaagtcggag   | aagtcttaag | agacttctta | taggaaactt | 180 |
| 20 | ggcttgtgt              | g aagcatgagc | agaagccata   | gttgacttat | ccacggagtg | gaaaaatgcc | 240 |
|    | gaagaggca              | a aacggagcaa | tccgtaaagt   | atgggaaatg | aagctgttga | agttaaaagc | 300 |
| 25 | taacttgtt              | g tttagttttg | agggaccata   | aagtcttcta | tatgggggta | tagctcagct | 360 |
|    | gggagagca              | c ctgccttgca | agcagggggt   | cagcggttcg | atcccgctta | cctccaccat | 420 |
| 30 | aatatatct              | g gtttctctaa | tgtttattat   | gttctttgaa | aactgcacag | agaagaagaa | 480 |

|    | aactgtaatt | aggataacat  | ctaaaaccta   | gaagtggcgg | caaaaaacgt | ttggtcaagc | 540 |
|----|------------|-------------|--------------|------------|------------|------------|-----|
|    | tactaagggc | gtacggtgga  | tgcctaggcg   | ctaagagtcg | aagaaggacg | cggcgagcgg | 600 |
| 5  | cgaaacgcca | cggggagcag  | taagcatgcc   | ttgatccgtg | gatatccgaa | tggggcaacc | 660 |
|    | са         |             |              |            |            |            | 662 |
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|    |            |             |              |            |            |            |     |
|    | catgttcact | ctggaagtga  | gcatatccta   | aggtcgatgc | tttgaaggac | gtcacggaag | 120 |
|    |            |             |              |            |            |            |     |
| 20 | agatgaagtg | aaacggttca  | aagctggaga   | agtctataga | gacttcgaag | tgccgaagag | 180 |
|    |            |             | -4           |            |            |            | 240 |
|    | gcaaagcagg | ggaaatctgc  | ataagatgac   | cctgaagtcg | agtcaaacct | gttcaagcgc | 240 |
|    | aagcttactt | gttgtttagt  | tttgagagac   | cataaagtct | tctatgggct | tatagctcag | 300 |
| 25 |            |             |              |            |            |            |     |
|    | ctggttagag | cgcacgcctg  | ataagcgtga   | ggtcggtggt | tcgagtccac | ctaggcccac | 360 |
|    |            |             |              |            |            |            |     |
|    | cattattcaa | agaggataga  | gacccgaacc   | tccaaacaat | acttcacgcc | agaacatacc | 420 |
|    |            |             |              |            |            |            |     |

taacaggggt gagtattgag aggggagcgg ctcccctctc aacgacatgg gggtatagct 480

|    | cagctggggg | agcacctgcc  | ttgcaagcag  | ggggtcagcg | gttcgatccc | gcttacctcc | 540 |
|----|------------|-------------|-------------|------------|------------|------------|-----|
| 5  | accatcatat | actggtttct  | ctaatgttct  | ttgaaaactg | cacagagaag | aaaaaactgt | 600 |
| J  | aatttaggat | aacatctgaa  | aaacctgaat  | gtggcggaga | cggttggtca | agctactaag | 660 |
|    | ggcgtacggt | ggatgcctag  | gcgctaagag  | tcgaagaagg | acgċggcgag | cggcgaaacg | 720 |
| 10 | ccacggggag | cagtaagcat  | gccttgatcc  | gtggatatcc | gaatggggca | accca      | 775 |
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| 20 | aaggctttta | ctatactgtt  | taattttgag  | ggacttttgt | ttctcaataa | gcagacaacc | 120 |
|    | aaaatcttag | attttgtgtt  | agtcgcttag  | ttaaaaattc | tgtaattcac | gacaatagtt | 180 |
| 25 | ttaaaccaac | aaaaaatgaa  | tggaagaatt  | tttaacatct | atagtcttt  | agattgttct | 240 |
|    | ttgaaaacta | aacaatgata  | tgagaaaaga  | aaagctgaag | taattcacta | aaggtcaagt | 300 |
| 30 | tattaagggc | aaagggtgga  | tgccttggca  | ctaggagccg | aagaaggacg | tggtaagctg | 360 |

|    | cgaaaa | gcca | cggggagctg  | caagcaagta  | ttgatccgtg | gatgtccgaa | tggggaaacc | 420 |
|----|--------|------|-------------|-------------|------------|------------|------------|-----|
|    | са     |      |             |             |            |            |            | 422 |
| 5  |        |      |             |             |            |            |            |     |
|    | ⟨210⟩  | 11   |             |             |            |            |            |     |
|    | <211>  | 699  |             |             |            |            |            |     |
|    | <212>  | DNA  |             |             |            |            |            |     |
|    | <213>  | Desu | ulfuromonas | chloroether | nica       |            |            |     |
| 10 |        |      |             |             |            |            |            |     |
|    | <400>  | 11   |             |             |            | •          |            |     |
|    | aagtcg | taac | aaggtagccg  | taggggaacc  | tgcggcctgg | atcacctcct | ttctaaggag | 60  |
|    |        |      |             |             |            |            |            |     |
|    | cctcct | tact | cgtaagagta  | aaggcatcct  | ggtcaatccc | tcggcatggt | ccgagcggat | 120 |
| 15 |        |      |             |             |            |            |            |     |
|    | gcccgc | aaag | catcattgtc  | tgctatttag  | ttttgagaga | ccagaacctc | gcaagaggtt | 180 |
|    |        |      |             |             |            |            |            |     |
|    | ttttgt | tctt | tgagacaaga  | cgaacgaagg  | tggaagtggg | ctagtagctc | agctggctag | 240 |
|    |        |      |             |             |            |            |            |     |
| 20 | agcaca | cgac | tgataatcgt  | gaggtcggag  | gttcgagtcc | tccctggccc | accagattat | 300 |
|    | •      |      |             |             |            |            |            |     |
|    | ttgggg | gtgt | agctcagttg  | ggagagcgcc  | tgccttgcac | gcaggaggtc | atcggttcga | 360 |
|    |        |      |             |             |            |            |            |     |
|    | tcccgt | tcac | ctccaccaga  | tgttctgtca  | ggagtaagga | gagaagagtg | aggagtacac | 420 |
| 25 |        |      |             |             |            |            |            |     |
|    | ctcacc | ctaa | cgccttacgc  | ctcaccgatt  | ttcttgttct | ttggcaattg | cataagactg | 480 |
|    |        |      |             |             |            |            |            |     |
|    | atacga | tgca | cgaagtaaag  | cgttgcgtac  | gcaagtacgt | gacacgcgaa | ggtagcaaca | 540 |
|    |        |      |             |             |            |            |            |     |
| 30 | cgatcg | ctta | agtagaagac  | tttttatgg   | tcaagctatt | aagggcgtac | ggtggatgcc | 600 |

|    | ttggcat | tcgg | gaggcgatga  | aggacgtggt | aagctgcgaa | aagcttcggt | aagccgctaa | 660 |
|----|---------|------|-------------|------------|------------|------------|------------|-----|
| 5  | acaggo  | tttg | acccggagat  | gtccgaatgg | ggaaaccca  |            |            | 699 |
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|    | <211>   | 391  |             |            |            |            |            |     |
|    | <212>   | DNA  |             |            |            |            |            |     |
| 10 | <213>   | Acet | tobacterium | woodii     |            |            |            |     |
|    | <400>   | 12   |             |            |            |            |            |     |
|    | aagtcg  | taac | aaggtagccg  | tatcggaagg | tgcggctgga | tcacctcctt | tctagggaat | 60  |
| 15 | acagga  | agtc | atggtactat  | tttcttttgt | atgaccatct | ggttatgcaa | aaacagttaa | 120 |
|    | agaagg  | catc | ttaggatgca  | tttttaacg  | ggacaaatac | cggagtagtg | gtagcaggtc | 180 |
| 20 | ccaatc  | gatc | attgaaaaca  | gcatagtgta | taaataaaat | tataaaatac | aatttcttaa | 240 |
| 20 | cacgaa  | aacg | taaattatta  | ggatcaagaa | gaaaagagca | cagggtgaat | gccttggcaa | 300 |
|    | tcagag  | ccga | cgaaggacgc  | gacaagctgc | gaaaagctac | gtgtaggtgc | acataaccgt | 360 |
| 25 | taaagc  | gtag | atatccgaat  | ggggcaaccc | а          |            |            | 391 |
|    | <210>   | 13   |             |            |            |            |            |     |
|    | <211>   | 608  |             |            |            |            |            |     |
| 30 | <212>   | DNA  |             |            |            |            |            |     |

## <213> Dehalobacter restrictus

<400> 13

60 aagtcgtaac aaggtagccg tatcggaagg tgcggctgga tcacctcctt tctaaggaga 5 120 accgattgaa gctagacttc aatctactcc aaggtcggta cttagagtaa agcagtgcaa actggactga ctctcaagta aggtgagttt agcaatttat ttcttgttgt ttagttttga 180 10 240 gtgacctgag cacagtaatg tgtaaaagaa acactcaaat aatgtccata catatcagag 300 attotggtaa gtatggaaaa acatoottgt totttgaaaa otgoacaacg agaaaagcag 360 aatgogaaat gogaaagtaa agacaacgaa atggogttoa aattotaaag ogcaaaaact 15 420 taacgttttc gcgcgtggca aatttgaact taggagcatc tatgctccgt caggtaagaa 480 ttactaagcg cataggagac attcaaatca tctataacaa gtcgaggaag aaccagaagg 20 540 tcaagatata aagggcatac ggtggatgcc ttggcgccaa gagccgaaga aggacgcggt 600 taacagcgaa atgccacggg gagtcgtaag caggcataga tccgtggatg tccgaatggg 608 gaaaccca

25

<210> 14

<211> 689

<212> DNA

30 <213> Desulfitobacterium sp. strain PCE1

|    | <400>  | 14   |            |            |            |            |            |     |
|----|--------|------|------------|------------|------------|------------|------------|-----|
|    | aagtcg | taac | aaggtagccg | tatcggaagg | tgcggctgga | tcacctcctt | tctaaggaga | 60  |
| 5  | catggt | ttct | cgctagagaa | atcatatcct | aaggtcgatg | ctttgaagga | cgtcatggaa | 120 |
|    | gcaatg | aagt | gaaacgattc | aaagttggag | aagtcttaag | agacttctga | aagccgaaga | 180 |
| 10 | ggcaaa | acgg | agcaatccgt | aaagtatgag | aaatgaagct | gttgaagtta | aaagctaact | 240 |
| 10 | tgttgt | ttag | ttttgaggga | ccataaagtc | ttctatgggc | ttatagctca | gctggttaga | 300 |
|    | gcgcac | gcct | gataagcgtg | aggtcggtgg | ttcgagtcca | cctaggccca | ccataaaaga | 360 |
| 15 | ttgata | ttgt | gggggtatag | ctcagctggg | agagcacctg | ccttgcaagc | agggggtcag | 420 |
|    | cggttc | gacc | ccgcttacct | ccaccataat | atatctggtt | tctctaatgt | ttattatgtt | 480 |
| 20 | ctttga | aaac | tgcacagaga | agaagaaaac | tgtaattagg | ataacatcta | aaacctagaa | 540 |
| 20 | gtggcg | gcaa | aaaacgtttg | gtcaagctac | taagggcgta | cggtggatgc | ctaggcgcta | 600 |
|    | agagtc | gaag | aaggacgcgg | cgagcggcga | aacgccacgg | ggagcagtaa | gcatgccttg | 660 |
| 25 | atccgt | ggat | atccgaatgg | ggcaaccca  |            |            |            | 689 |

⟨210⟩ 15

<211> 468

30 <212> DNA

## <213> Desulfitobacterium frappieri TCE1

|    | <400>      | 15    |             |            |            |            |              |     |
|----|------------|-------|-------------|------------|------------|------------|--------------|-----|
|    | aagtcg     | taac  | aaggtagccg  | tatcggaagg | tgcggctgga | tcacctcctt | tctaaggagt   | 60  |
| 5  |            |       |             |            |            |            |              |     |
|    | tcataa     | ggac  | tcacactgtt  | ttgtttataa | atttgattcg | ctgaatttcc | agaatcaatc   | 120 |
|    |            |       |             |            |            |            |              | 100 |
|    | acattg     | aaat  | cctttggatt  | tcaattgtta | attgtgcact | gtgaaatgcg | aattgataac   | 180 |
| 10 | at a a a a | σ+ σ+ | agctcagttg  | ggagagcacc | tgccttgcaa | gcaggggtc  | aggagttoga   | 240 |
| 10 | 5.8888     | 8.8.  | agotoagttg  | ggagagcacc | rgoottgoaa | 500555550  | aggag c coga | 210 |
|    | ctctcc     | tcat  | ctccaccaaa  | gacattcata | gtttaaatta | attatgaatt | gtttaaactg   | 300 |
|    |            |       |             |            |            |            |              |     |
|    | aacatt     | gaaa  | actacaaata  | tacaataaac | atgaaatagg | tcaagttatt | aagggcgtag   | 360 |
| 15 |            |       |             |            |            |            |              |     |
|    | ggcgaa     | tgcc  | ttggcaccaa  | gagccgatga | aggacgggat | aagcaccgat | atgcttcggg   | 420 |
|    |            |       |             |            |            |            |              | 400 |
|    | gagtcg     | caaa  | tagacattga  | tccggagatt | tccgaatggg | gcaaccca   |              | 468 |
| 20 |            |       |             |            |            |            |              |     |
| 20 | <210>      | 16    |             |            |            |            |              |     |
|    | <211>      | 511   |             |            |            |            |              | ·   |
|    | <212>      | DNA   |             |            |            |            |              |     |
|    | <213>      | Acet  | tobacterium | woodii     |            |            |              |     |
| 25 |            |       |             |            |            |            |              |     |
| •  | <400>      | 16    |             |            |            |            |              |     |
|    | aagtcg     | taac  | aaggtagccg  | tatcggaagg | tgcggctgga | tcacctcctt | tctaaggaaa   | 60  |
|    |            |       |             |            |            |            |              | 400 |
|    | acaggg     | agtc  | atggtactat  | tttcttttgt | atgaccttta | ggttatacaa | aaggatcgta   | 120 |

|     | gtttctggca a  | ttttcttta  | ttttataaa   | gatgaaaatt | gacataaact | gcgttagttt | 180 |
|-----|---------------|------------|-------------|------------|------------|------------|-----|
|     | ttacaccgct ca | atgcgctaa  | cgcttaatga  | gctgccaaat | tgaaaatttg | ggtaaaaacg | 240 |
| 5   | tcaaagtggt c  | attgaaaac  | agcatagtgt  | attaaaaaaa | catacaattt | cagatgttaa | 300 |
|     | caacataaga a  | aaacgtaag  | ttaaaggatc  | gtagttttag | gactacaggc | gactgacgaa | 360 |
| 10  | gttctactgt c  | agttgttaa  | ggatcaagaa  | atgaagggca | cagggcggat | gccttggcac | 420 |
| 10  | tcagagccga t  | gaaggacgc  | gacaagctgc  | gaaaagctgc | gtgaaggtgc | acataaccgt | 480 |
|     | tgaagcgcag a  | tatccgaat  | ggggcaaccc  | a          |            |            | 511 |
| 15  |               |            |             |            |            |            |     |
|     | <210> 17      |            |             |            |            |            |     |
|     | <211> 471     |            |             |            |            |            |     |
|     | <212> DNA     |            |             |            |            |            |     |
|     | <213> Desul   | fomonile t | iedjei DCB- | -1         |            |            |     |
| 20  |               |            |             |            |            |            |     |
|     | <400> 17      |            |             |            |            |            |     |
|     | aagtcgtaac a  | aggtagccg  | taggggaacc  | tgcggctgga | tcacctcctt | tctaaggtgt | 60  |
| 0.5 | aaccttagta t  | ccgaacgca  | cacatctgct  | attcagttct | gagaggttga | cgataacggc | 120 |
| 25  | ttcgggccta t  | agctcagtt  | cggttagagc  | gcacgcctga | taagcgtgag | gtcgttggtt | 180 |
|     | caattccaac t  | aggcccacc  | acgcctctat  | cgggggtgta | gctcagctgg | gagagcacct | 240 |
| 30  | gctttgcaag c  | agggggtca  | tcggttcgaa  | tccgttcacc | tccaccagtt | ctttgacaat | 300 |

|    | cgaataggtt           | ttagatcgag       | gatactcata   | tatttaggca | atcaagctac | taagggccta | 360 |
|----|----------------------|------------------|--------------|------------|------------|------------|-----|
| ~  | cggtggatgc           | cttggcatcg       | gaagacgatg   | aaggacgtgg | ttagctgcga | taagcctcgg | 420 |
| 5  | ggagttgcta           | aacacactgt       | gatccgggga   | tttccgaatg | gggcaaccca | a          | 471 |
|    | <210> 18             |                  |              |            |            |            |     |
| 10 | <211> 847            |                  |              |            |            |            |     |
|    | <212> DNA <213> Deha |                  | o athonogona | . 105      |            |            |     |
|    | (213/ Deni           | a l ococco i des | s ethenogene | es 190     |            |            |     |
|    | <400> 18             |                  |              |            |            |            |     |
| 15 | ggactggtaa           | ttgggacgaa       | gtcgtaacaa   | ggtagccgta | gcggaagctg | cggctggatc | 60  |
|    | acctcctttc           | taaggataat       | tggcctcgtg   | cctattaacc | taggtcgata | tccgacttaa | 120 |
|    | aacggatact           | tctctttct        | ttccgctatc   | caggggttaa | ggtgttagtg | ttataagggg | 180 |
| 20 | ataaaaatta           | ctttctcctg       | attgctaacc   | tgtatctatc | ccgctttgaa | actcatgtag | 240 |
|    | gttttgttag           | gcattttggg       | ctgaaggact   | tgcgctaagc | gtcctgtttg | ctatattata | 300 |
| 25 | ttgacgtttt           | tcgggtagta       | tttcgaagat   | acccaatctg | tctgttgtta | tcaatcgggc | 360 |
|    | cattagctca           | gctggttaga       | gcgcagtcct   | gataagactg | aggtccttgg | ttcgagacca | 420 |
| 30 | agatggccca           | ccataaagct       | aaaacttagc   | ataatcaaac | gaataaaaat | acctgctgat | 480 |

|    | taaccg        | gttt t | tcgcgagag  | aaccggtttt   | tttataaaga | agcaggaaga | taatgtctat | 540 |
|----|---------------|--------|------------|--------------|------------|------------|------------|-----|
|    | tatttc        | attt t | aggtgaata  | acctgcgctg   | caaattggta | tagtttagta | ttcaccgggt | 600 |
| 5  | tattgg        | gcgg g | caaaaaaat  | ctttgtgaaa   | tgaaaatatt | tactttaaaa | agactgattg | 660 |
|    | ccggag        | gtaa t | ataacagta  | tgataagtaa   | tgaaggttca | gaaaaagtat | tatctccgga | 720 |
| 10 | agaaca        | ggct a | aattacttg  | gcctgcttaa   | agggcgtttt | gagcaaaata | tacaccgcca | 780 |
| 10 | cgaggg        | catt g | tttgggcta  | aggtgcaaga   | aaagcttaag | gcagataccc | ttaaattgtg | 840 |
|    | gtcatt        | g      |            |              |            |            |            | 847 |
| 15 |               |        |            |              |            |            |            |     |
| -  | <210>         | 19     |            |              |            |            |            |     |
|    | <211>         | 40     |            |              |            |            |            |     |
|    | <212>         | DNA    |            |              |            |            |            |     |
|    | <213>         | Deha I | ospirillum | n multivorar | าร         |            |            |     |
| 20 |               |        |            |              |            |            |            |     |
|    | <400>         | 19     |            |              |            |            |            |     |
|    | aggctg        | taag a | ggcgatgaa  | ggacgtacta   | gactgcgata |            |            | 40  |
|    |               |        |            |              |            |            |            |     |
| 25 | <210>         | 20     |            |              |            |            |            |     |
|    | <211>         | 40     |            |              |            |            |            |     |
|    | <212>         | DNA    |            |              |            |            |            |     |
|    | <213>         | Deha I | ospirillum | n multivorar | าร         |            |            |     |
| 30 | <b>/</b> 400\ | 20     |            |              |            |            |            |     |

|    | gctgta | agag gcgatgaagg acgtactaga ctgcgataag | 40 |
|----|--------|---------------------------------------|----|
|    |        |                                       |    |
|    | <210>  | 21                                    |    |
| 5  | <211>  | 40                                    |    |
|    | <212>  | DNA                                   |    |
|    | <213>  | Dehalospirillum multivorans           |    |
|    |        |                                       |    |
|    | <400>  |                                       |    |
| 10 | cggttg | gatc acctccttc tagagtatag gggcactatc  | 40 |
|    |        |                                       |    |
|    | <210>  | 22                                    |    |
|    | <211>  | 40                                    |    |
| 15 | <212>  | DNA                                   |    |
|    | <213>  | Dehalospirillum multivorans           |    |
|    |        |                                       |    |
|    | <400>  | 22                                    |    |
|    | gcggtt | ggat cacctccttt ctagagtata ggggcactat | 40 |
| 20 |        |                                       |    |
|    |        |                                       |    |
|    | <210>  | 23                                    |    |
|    | <211>  | 40                                    |    |
|    | <212>  | DNA                                   |    |
| 25 | <213>  | Dehalospirillum multivorans           |    |
|    | <400>  | 22                                    |    |
|    |        | tgga tcacctcctt tctagagtat aggggcacta | 40 |
|    | reveer | ιεξα τομοσίοστι τοταξαξίαι αξέξξυαστα | 70 |

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<210> 24
     <211> 40
     <212> DNA
     <213> Dehalospirillum multivorans
 5
     <400> 24
                                                                        40
     ggtcagcggt tcgatcccgc tattctccac cattttttag
10
    <210> 25
     <211> 40
     <212> DNA
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    <400> 25
15
     gaggtcagcg gttcgatccc gctattctcc accatttttt
                                                                        40
     <210> 26
20
    <211> 40
     <212> DNA
     <213> Desulfitobacterium frappieri
     <400> 26
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25
    ctggagaagt ctgaagagac ttcgaaatgc cgaagaggca
     <210> 27
     <211> 40
30
     <212> DNA
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<213> Desulfitobacterium frappieri
     <400> 27
                                                                         40
     agctggagaa gtctgaagag acttcgaaat gccgaagagg
 5
     <210> 28
     <211> 40
     <212> DNA
10
     <213> Desulfitobacterium frappieri
     <400> 28
                                                                         40 -
     agtctgaaga gacttcgaaa tgccgaagag gcaaagcagg
15
     <210> 29
     <211> 40
     <212> DNA
     <213> Desulfitobacterium frappieri
20
     <400> 29
                                                                         40
     tgaagagact tcgaaatgcc gaagaggcaa agcaggggaa
25
     <210> 30
     <211> 40
     <212> DNA
     <213> Desulfitobacterium frappieri
30
     <400> 30
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|    | gaagag                                     | actt cgaaatgccg aagaggcaaa gcaggggaaa | 40 |  |  |  |
|----|--|---------------------------------------|----|--|--|--|
|    |  |                                       |    |  |  |  |
|    | <210>                                      | 31                                    |    |  |  |  |
| 5  | <211>                                      | 40                                    |    |  |  |  |
|    | <212>                                      | DNA                                   |    |  |  |  |
|    | <213>                                      | Actinomycetales Sm-1                  |    |  |  |  |
|    | <400>                                      | 31                                    |    |  |  |  |
| 10 | gcgacg                                     | atga tccgcgaaac aagaggacat ggttttcttg | 40 |  |  |  |
|    |  |                                       |    |  |  |  |
|    | <210>                                      | 32                                    |    |  |  |  |
|    | <211>                                      | 40                                    |    |  |  |  |
| 15 | <212>                                      | DNA                                   |    |  |  |  |
|    | <213>                                      | Actinomycetales Sm-1                  |    |  |  |  |
|    | <400>                                      | 32                                    |    |  |  |  |
|    | tgatcc                                     | gcga aacaagagga catggtttc ttgcggtagg  | 40 |  |  |  |
| 20 |  |                                       |    |  |  |  |
|    | <210>                                      | 33                                    |    |  |  |  |
|    | <211>                                      | 40                                    |    |  |  |  |
|    | <212>                                      | DNA                                   |    |  |  |  |
| 25 | <213>                                      | Actinomycetales Sm-1                  |    |  |  |  |
|    | <400>                                      | 33                                    |    |  |  |  |
|    | caagaggaca tggtttctt gcggtagggg ttgttgtgtg |                                       |    |  |  |  |

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<210> 34
    <211> 40
    <212> DNA
    <213> Actinomycetales Sm-1
5
    <400> 34
                                                                        40
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10
    <210> 35
    <211> 40
    <212> DNA
     <213> Actinomycetales Sm-1
15
    <400> 35
                                                                        40
     gaggacatgg ttttcttgcg gtaggggttg ttgtgtgttg
    <210> 36
20
    <211> 40
    <212> DNA
     <213> Rhodococcus rhodococcus
     <400> 36
                                                                        40
25
    gttttgtcag cgacgatgat cgggaacgaa ggggttgttt
     <210> 37
     <211> 40
30
     <212> DNA
```

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<213> Rhodococcus rhodococcus
     <400> 37
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     acgatgatcg ggaacgaagg ggttgtttct tcttccggta
 5
     <210> 38
     <211> 40
     <212> DNA
10
     <213> Rhodococcus rhodococcus
     <400> 38
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                                                                         40
15
     <210> 39
     <211> 40
     <212> DNA
     <213> Rhodococcus rhodococcus
20
     <400> 39
                                                                         40
     tcagcgacga tgatcgggaa cgaaggggtt gtttcttctt
25
     <210> 40
     <211> 40
     <212> DNA
     <213> Rhodococcus rhodococcus ·
30
     <400> 40
```

|    | ggggtt | gttt cttcttccgg taccggttgt tgtgtgttgt | 40 |
|----|--------|---------------------------------------|----|
|    |        |                                       |    |
|    | <210>  | 41                                    |    |
| 5  | <211>  | 40                                    |    |
|    | <212>  | DNA                                   |    |
|    | <213>  | Xanthobacter flavus                   |    |
|    | <400>  | 41                                    |    |
| 10 | catcgt | gaat agggcattga tcgactgtac cgtggcaaca | 40 |
|    |        |                                       |    |
|    | <210>  | 42                                    |    |
|    | <211>  | 40                                    |    |
| 15 | <212>  | DNA                                   |    |
|    | <213>  | Xanthobacter flavus                   |    |
|    | <400>  | 42                                    |    |
|    | acatcg | tgaa tagggcattg atcgactgta ccgtggcaac | 40 |
| 20 |        |                                       |    |
|    | <210>  | <b>13</b>                             |    |
|    | <211>  | 40                                    |    |
|    | <212>  | DNA                                   |    |
| 25 | <213>  |                                       |    |
|    | (2.0)  |                                       |    |
|    | <400>  | 43                                    |    |
|    | ggtctt | gago gtottgtoog ogaatatotg tttogoatgt | 40 |

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<210> 44
     <211> 40
     <212> DNA
     <213> Xanthobacter flavus
 5
     <400> 44
                                                                       40
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10 <210> 45
     <211> 40
     <212> DNA
     <213> Xanthobacter flavus
15
   <400> 45
                                                                       40
     ctcttggggt cttgagcgtc ttgtccgcga atatctgttt
     <210> 46
20
   <211> 40
    <212> DNA
     <213> Mycobacterium L1
     <400> 46
25
                                                                       40
     ggtctggggg gtgtgtttgt gtgcttttga tgtgcagttt
     <210> 47
     <211> 40
30
    <212> DNA
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     <400> 47
                                                                         40
     gtctgggggg tgtgtttgtg tgcttttgat gtgcagtttc
5
     <210> 48
     <211> 40
     <212> DNA
10
     <213> Mycobacterium L1
     <400> 48
                                                                         40
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15
     <210> 49
     <211> 40
     <212> DNA
     <213> Desulfomicrobium norvegicum
20
     <400> 49
                                                                         40
     gcgcccaagc atagcagctt gtgatcattg acagacgaat
25
     <210> 50
     <211> 40
     <212> DNA
     <213> Desulfomicrobium norvegicum
30
     <400> 50
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|    | cagtto | gato otgttoacot coaccatttt coaactogac | 40 |
|----|--------|---------------------------------------|----|
|    |        |                                       |    |
|    | <210>  | 51                                    |    |
| 5  | <211>  | 40                                    |    |
|    | <212>  | DNA                                   |    |
|    | <213>  | Desulfomicrobium norvegicum           |    |
|    | <400>  | 51                                    |    |
| 10 | ctatgg | cgcc caagcatagc agcttgtgat cattgacaga | 40 |
|    |        |                                       |    |
|    | <210>  | 52                                    |    |
|    | <211>  | 40                                    |    |
| 15 | <212>  | DNA                                   |    |
|    | <213>  | Desulfomicrobium norvegicum           |    |
|    | <400>  | 52                                    |    |
|    | tatggc | gccc aagcatagca gcttgtgatc attgacagac | 40 |
| 20 |        |                                       |    |
|    | <210>  | 53                                    |    |
|    | <211>  | 40                                    |    |
|    | <212>  | DNA                                   |    |
| 25 | <213>  | Desulfomicrobium norvegicum           |    |
|    |        |                                       |    |
|    | <400>  | 53                                    |    |
|    | actatg | gcgc ccaagcatag cagcttgtga tcattgacag | 40 |

|    | <210>         | 54                                    |    |
|----|---------------|---------------------------------------|----|
|    | <211>         | 40                                    |    |
|    | <212>         | DNA                                   |    |
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|    | agtcta                           | taga gacttcgaag tgccgaagag gcaaagcagg       | 40 |
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| 5  | <211><br><212>                   | 61 40 DNA Desulfitobacterium hafniense      |    |
| 10 | <400><br>tataga                  | 61<br>gact tcgaagtgcc gaagaggcaa agcaggggaa | 40 |
| 15 | <210><br><211><br><212><br><213> |   |    |
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| 25 | <210><211><211><212><213>        |   |    |
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|    |                |                                       |    |
| 10 | <210>          | 65                                    |    |
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|    | <213>          | Clostridium formicoaceticum           |    |
|    |                |                                       |    |
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|    |                |                                       |    |
|    | <b>/010</b> \  |                                       |    |
| 00 | <210>          | 66                                    |    |
| 20 | <211><br><212> | 40<br>DNA                             |    |
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|    | (213/          | Crostriaium iormicoaceticum           |    |
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| 25 |                | gtgc caaggcatcc accetttgcc cttaataact | 40 |
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| 20 | /212\          | DNA                                   |    |

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| 20 |        |                      |         |            |    |
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|    | <210>  | 73                   |         |            |    |
|    | <211>  | 40                   |         |            |    |
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| 25 | <213>  | Desulfuromonas chlo  | roether | nica       |    |
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|    | <210>  | 74                                    |    |
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|    | <213>  | Desulfuromonas chloroethenica         |    |
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|    | <211>  | 40                                    |    |
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|    | <213>  | Acetobacterium woodii                 |    |
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|    | <210>  | 76                                    |    |
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| 20 | <212>  | DNA                                   |    |
|    |        | Acetobacterium woodii                 |    |
|    |        |                                       |    |
|    | <400>  | 76                                    |    |
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|    |        |                                       |    |
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| 30 | <212>  | DNA                                   |    |

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|            | <210>         | 81                                    |    |
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|            | <213>         | Dehalobacter restrictus               |    |
|            | <b>/400</b> \ | 01                                    |    |
| 10         | <400>         |                                       | 40 |
| 10         | gaaggt        | caag atataaaggg catacggtgg atgccttggc | 40 |
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|            | <b>/010</b> \ |                                       |    |
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| 20         |               |                                       |    |
|            | (010)         |                                       |    |
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|            | <400>         |                                       |    |
|            | gcgcgt        | ggca aatttgaact taggagcatc tatgctccgt | 40 |
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|    | <210>  | 84                                    |    |
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|    | <212>  | DNA                                   |    |
|    | <213>  | Dehalobacter restrictus               |    |
| 5  |        |                                       |    |
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|    |        |                                       |    |
| 10 | <210>  |                                       |    |
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|    | ⟨213⟩  | Dehalobacter restrictus               |    |
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| 10 |        | gtgg caaatttgaa cttaggagca tctatgctcc | 40 |
|    | cogogo | gigg oddailigad ollaggagda totalgoloo |    |
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|    | <210>  | 86                                    |    |
| 20 | <211>  | 40                                    |    |
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|    | <213>  | Dehalobacter restrictus               |    |
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| 25 | cgcgtg | gcaa atttgaactt aggagcatct atgctccgtc | 40 |
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| 30 | <212>  | DNA                                   |    |

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| 5  | <211>                                       | 40                                    |    |
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| •  | <400>                                       | 91                                    |    |
| 10 | gacttc                                      | tgaa agccgaagag gcaaaacgga gcaatccgta | 40 |
|    |   |                                       |    |
|    | <210>                                       | 92                                    |    |
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|    | <213>                                       | Desulfitobacterium frappieri TCE1     |    |
|    | <400>                                       | 92                                    |    |
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| 20 |   |                                       |    |
|    | <210>                                       | 93                                    |    |
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| 25 | <213>                                       | Desulfitobacterium frappieri TCE1     |    |
|    | <400>                                       | 93                                    |    |
|    |   | gcac cgatatgctt cggggagtcg caaatagaca | 40 |
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|    |        |                                       |    |
| 10 | <210>  | 95                                    |    |
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|    | <213>  | Desulfitobacterium frappieri TCE1     |    |
|    |        |                                       |    |
| 15 | <400>  |                                       | 40 |
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|    |        |                                       |    |
|    | <210>  | 96                                    |    |
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|    | <212>  | DNA                                   |    |
|    | <213>  | Desulfitobacterium frappieri TCE1     |    |
|    |        |                                       |    |
|    | <400>  | 96                                    |    |
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|    |        |                                       |    |
|    | <210>  | 97                                    |    |
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| 30 | <212>  | DNA                                   |    |

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| 5  | <210><br><211><br><212>          | 101<br>40<br>DNA                             |    |
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| 10 | <400>                            | 101<br>tcaa agaactggtg gaggtgaacg gattcgaacc | 40 |
| 15 | <210><br><211><br><212><br><213> |  |    |
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|    | <210>                            | 103  |    |
|    | <211>                            | 40   |    |
| 25 | <212>                            | DNA  Descriptions its tindia; DCP-1          |    |
| 25 | <213>                            | Desulfomonile tiedjei DCB-1                  |    |
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|    | taaccg                           | aact gagctatagg cccgaagccg ttatcgtcaa        | 40 |

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|    |                 |   |    |
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|    | <210>           | 109                                       |    |
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| 20 | (213)           | Dehalococcoides ethenogenes 195           |    |
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|    |                 |   |    |
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| 25 | <210>           | 110                                       |    |
|    | <211>           | 40  |    |
|    | <212>           | DNA                                       |    |
|    | <213>           | Dehalococcoides ethenogenes 195           |    |
| 30 | <400>           | 110                                       |    |

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| 5  | <211>  | 40                                    |    |
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|    | <210>  | 112                                   |    |
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|    | <210>  | 113                                   |    |
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|    | <b>&lt;211&gt;</b>      |                                       |    |
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| 25 | <223>                   | Sense primer 27F for PCR              |    |
|    |                         |                                       |    |
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| 15 | <212>  | DNA                           |    |
|    | <213>  | Artificial                    |    |
|    |        |                               |    |
|    | <220>  |                               |    |
|    | <223>  | Antisense primer 341R for PCR |    |
| 20 |        |                               |    |
| ٠  | <400>  | 118                           |    |
|    | caatga | ccac aatttaaggg               | 20 |